The Nuclear Option for SE Europe

Session III “Investment and Financing Issues”

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Outline

- **Westinghouse Overview**
- Investment and Financing Issues:
  - Challenges: Capital-Intensive Nature
  - What Vendors Can and Cannot Do
  - Recommendations
- Westinghouse Global Capabilities and Experience

Westinghouse

Westinghouse Electric Company

- Founded in 1886 in Pittsburgh, Pennsylvania, by George Westinghouse
- Responsible for some of the world's most important achievements:
  - Alternating current technology
  - First commercial radio broadcast (KDKA-1920)
  - USS Nautilus nuclear submarine
  - First camera on the moon
  - **Commercial nuclear power**

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Leading through Technology

*Nearly **50 percent** of the nuclear power plants in operation worldwide are based on Westinghouse technology*

- Westinghouse's AP1000® pressurized water reactor design features **safe** passive technology design certified in multiple countries, and based upon Westinghouse's 50+ years of experience

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Westinghouse Locations

Westinghouse

60+ Sites Worldwide!

Westinghouse in Europe Today

Serving our Customers Across the Region

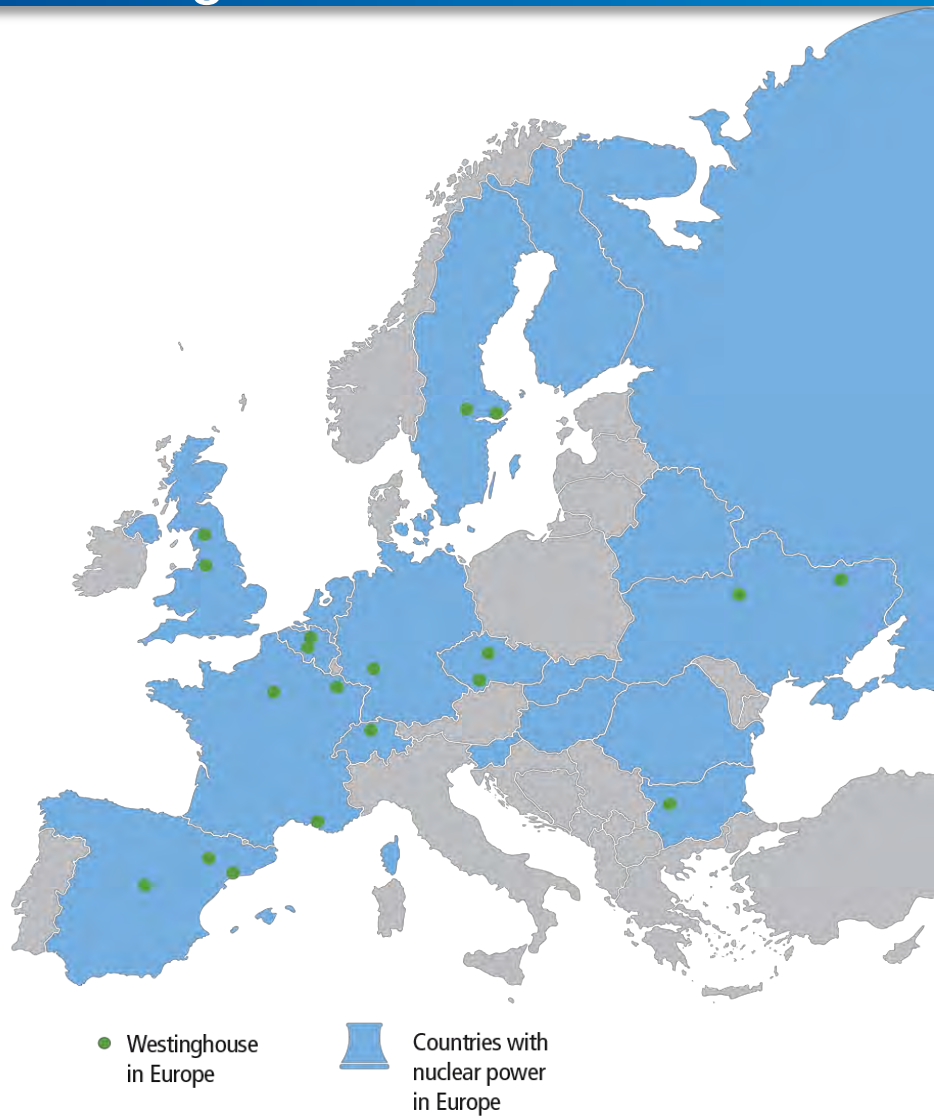
1962
first Pressurized Water Reactor (PWR) in Europe was built by Westinghouse

60%
of the nuclear power plants in the EU are based on Westinghouse technology

25
commercial reactors designed and supplied by Westinghouse across Europe

4,000
highly-skilled and trained people across Europe, plus an additional 1,500 contractors

- 54 out of the 58 French reactors are based on Westinghouse licensed technology.
- 65 nuclear reactors in Europe are currently fuelled by Westinghouse (PWR – including VVER, BWR, AGR and Magnox).
- We have operations in 10 European countries.
- Our AP1000® reactor is the safest, most efficient and reliable design currently available in the worldwide marketplace.



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Challenges: Capital-Intensive Nature

- New nuclear power plants are large, capital-intensive projects (multi-billion dollar investments)
- Large upfront costs and long project cycles carry a certain degree of risk.
- Nuclear power has high fixed costs (construction) and low variable costs (fuel, operation and maintenance etc):
  - cash flows and profitability are sensitive to electricity price fluctuations.
- Nuclear has long-term financial advantages, provided that a stable and predictable investment environment can be guaranteed.

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What Vendors Can and Cannot Do

- Can:
  - Design safe and economic nuclear power plants
  - Standardize designs
  - Build to time and budget
  - Optimizing construction through lessons-learned
  - Facilitate export credit (U.S. Ex-Im Bank, JBIC etc)
- Cannot (should not):
  - Act as a bank and provide financing
  - Provide high-levels of equity on a long-term basis, i.e. beyond construction and start-up phase
  - Operate nuclear power plants

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Recommendations - I

- Expansion/introduction of innovative financial instruments to **support capital intensive projects:**
  - Regulated cost-recovery (U.S.)
  - Power purchase agreements (Canada)
  - Loan guarantees (U.S. and UK)
  - Feed-in tariffs (UK EMR/CfD)
  - Floor price for ‘carbon’ to support de-carbonization (UK)
  - Capacity market measures
  - Capacitate international lenders (EBRD, EIB, World Bank)
  - Establishing public-private partnerships
  - Tax credits or other measures

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Recommendations - II

- Clear recognition by policy makers that **nuclear energy** is being developed by some countries and a **permanent part of the energy mix**
- Consistent and **fair treatment** of all **low-carbon** power generation
- **Coherent, predictable and long-term energy/environment** policy framework
- Allowing nuclear power plants to **operate at high capacity factors**, preferably under baseload conditions

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Recommendations - III

- H**armonization in nuclear licensing** requirements whilst also ensuring high-levels of safety
- Establishing an **efficient and effective regulatory system** (one-step licensing process with pre-approval of standardized designs etc)

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Westinghouse Global Capabilities and Experience

Operating Plants Business

Delivers operating plant products and services, including global field services, instrumentation and control, welding and machining, and installation-related functions

New Plants and Major Projects

Delivers both new-plant projects and major projects for new and operating plants on a global basis

Decommissioning, Decontamination and Remediation

Deploys global technologies and forms local partnerships to carry out long-term projects

Nuclear Fuel and Components Mfg.

Designs and delivers fuel for PWR, BWR, VVER and AGR reactors, and oversees manufacturing operations worldwide

Engineering Center of Excellence

Supports all product lines by driving common engineering capabilities and accelerating innovation

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Westinghouse technology is the basis for nearly 50 percent of nuclear power plants operating worldwide!

AP1000 Plant: Safe, Simple and Standardized

***AP1000** Plant Site at Sanmen, China*

- **Passive safety** replaces mechanical and electrical systems – harnesses natural forces like gravity, convection and condensation to achieve safe shutdown
- **Strong licensing pedigree** based on reviews in multiple countries; first and only Generation III+ reactor to receive design certification from the U.S. NRC
- **Simplified design and modular construction** provide a plant that is easier and less expensive to build, operate and maintain

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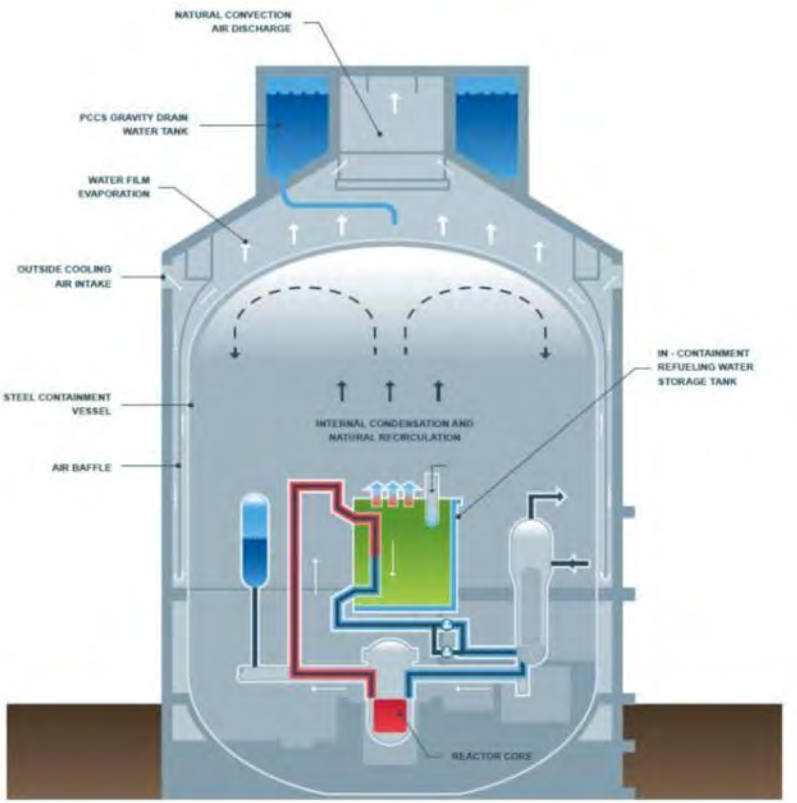
Major Safety Advancements of the **AP1000** Plant

Passive Safety-Related Systems

- Use “passive” processes only, no active pumps, diesels, ….
- One-time alignment of valves
- No support systems required after actuation
- Greatly reduced dependency on operator actions

Active Defense in Depth-Related Systems

- Reliably support normal operation
- Redundant equipment powered by onsite diesels
- Minimize challenges to passive safety systems
- Not necessary to mitigate design basis accidents



All Critical Station Blackout Response Features FAIL SAFE

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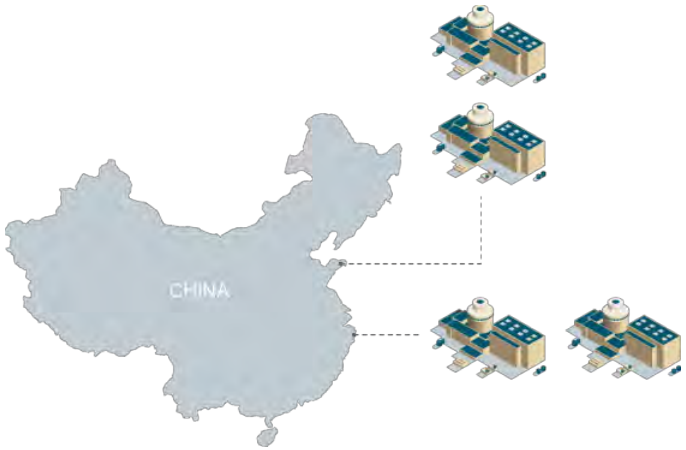
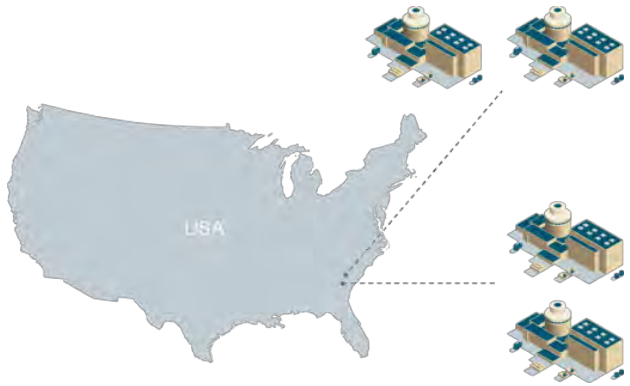
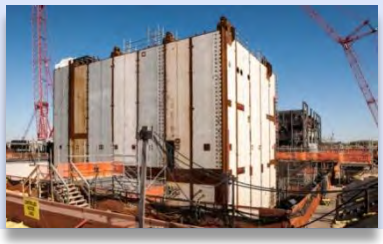
An Emerging Global Fleet

- Eight **AP1000** units under construction in China and U.S.
- Shareholder agreements signed for additional units







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Summary

- Global energy demand continues to increase significantly
- Nuclear energy provides multiple benefits as a source of electricity generation and will play an increasing role in meeting world energy needs
- Westinghouse is focused on providing fuel, services, technology, plant design and equipment for the commercial nuclear electric power industry
- The **AP1000** plant is being deployed globally and offers distinct advantages for both established and new nuclear energy markets

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Thank you!